

N79-31172 D6

**GLOBAL ENCLOSURE FIRE MODELING  
WITH APPLICATIONS  
FIREMEN**

**FIRE MODELING AND SCALING METHODS  
510-56-05**



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## OUTLINE

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- BRIEF REVIEW OF LERC LIMITING ENERGY RELEASE CRITERIA
- APPLICATION OF LERC TO JSC/BOEING IGNITION SOURCE FULL-SCALE TESTS
- APPLICATION OF LERC TO JSC/DACFIR MATH-MODEL VALIDATION-TESTS



## LIMITING ENERGY RELEASE CRITERIA-LERC

### FLAME SPREAD RATE

$$\dot{Q}_S = (\dot{Q}/A) b v_t \quad (\text{LINEAR})$$

### FUEL SURFACE LIMIT

$$\dot{Q}_f = 2500 A_f \quad (\text{GASOLINE})$$

### VENTILATION LIMIT

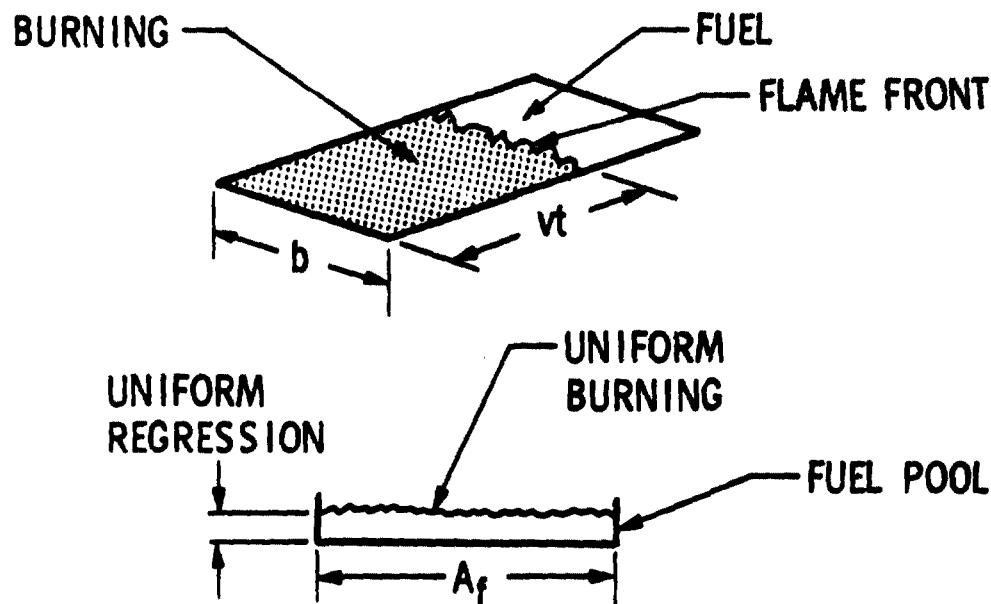
$$\dot{Q}_v = 1580 A H^{1/2}$$

### ENCLOSURE VOLUME

$$t_e = \frac{58 V_e}{\dot{Q}}$$

### FUEL LOAD

$$t_e = \frac{M_f \Delta H}{\dot{Q}}$$



### COMBINED CRITERIA OXYGEN SUPPLY

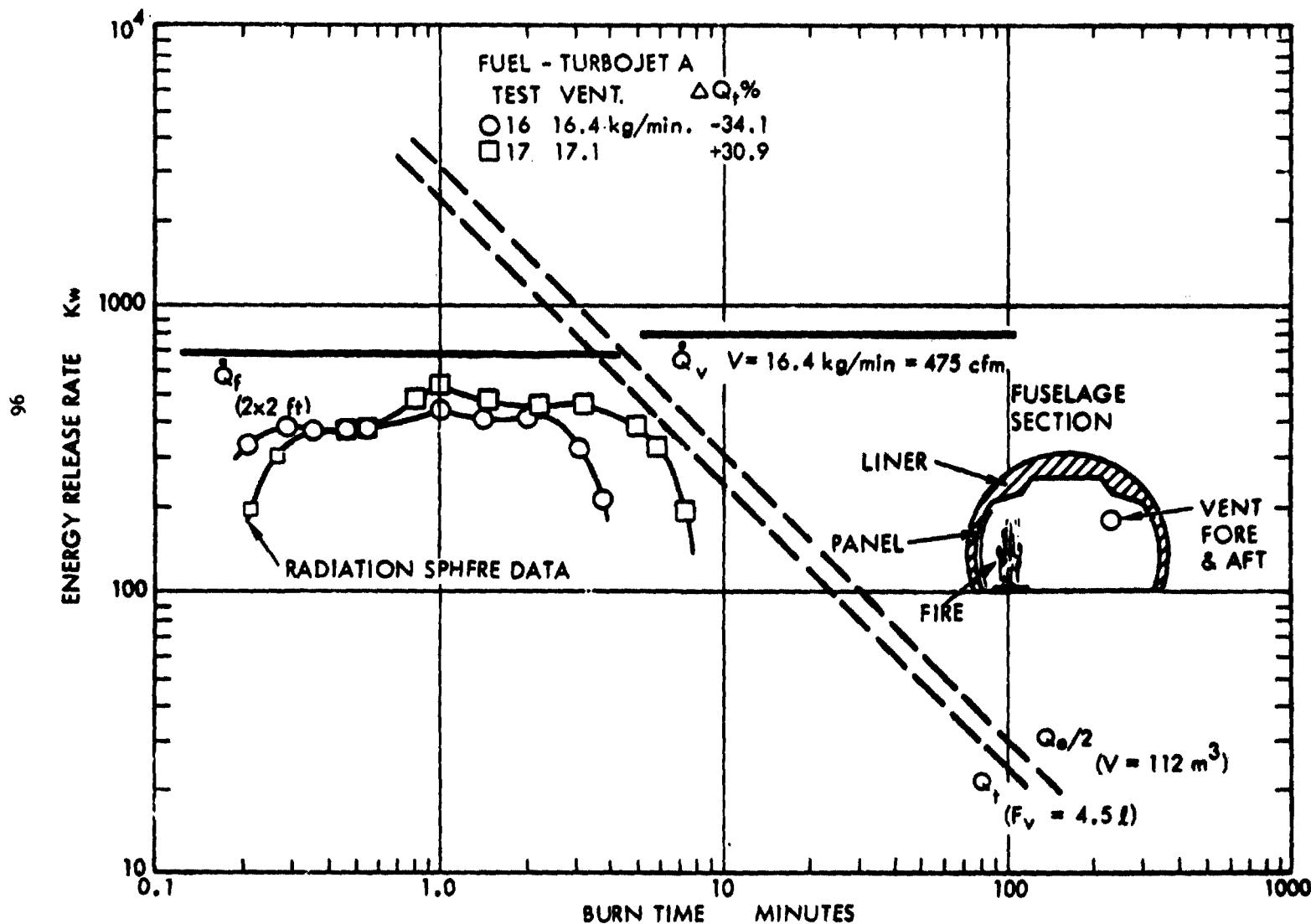
$$t_e = \frac{Q_e}{2\dot{Q}} (1 - \dot{Q}_v/\dot{Q})^{-1}$$
$$Q_e = 58 V_e$$

UNITS:  
KILOWATTS  
METERS  
KILOGRAMS  
MINUTES



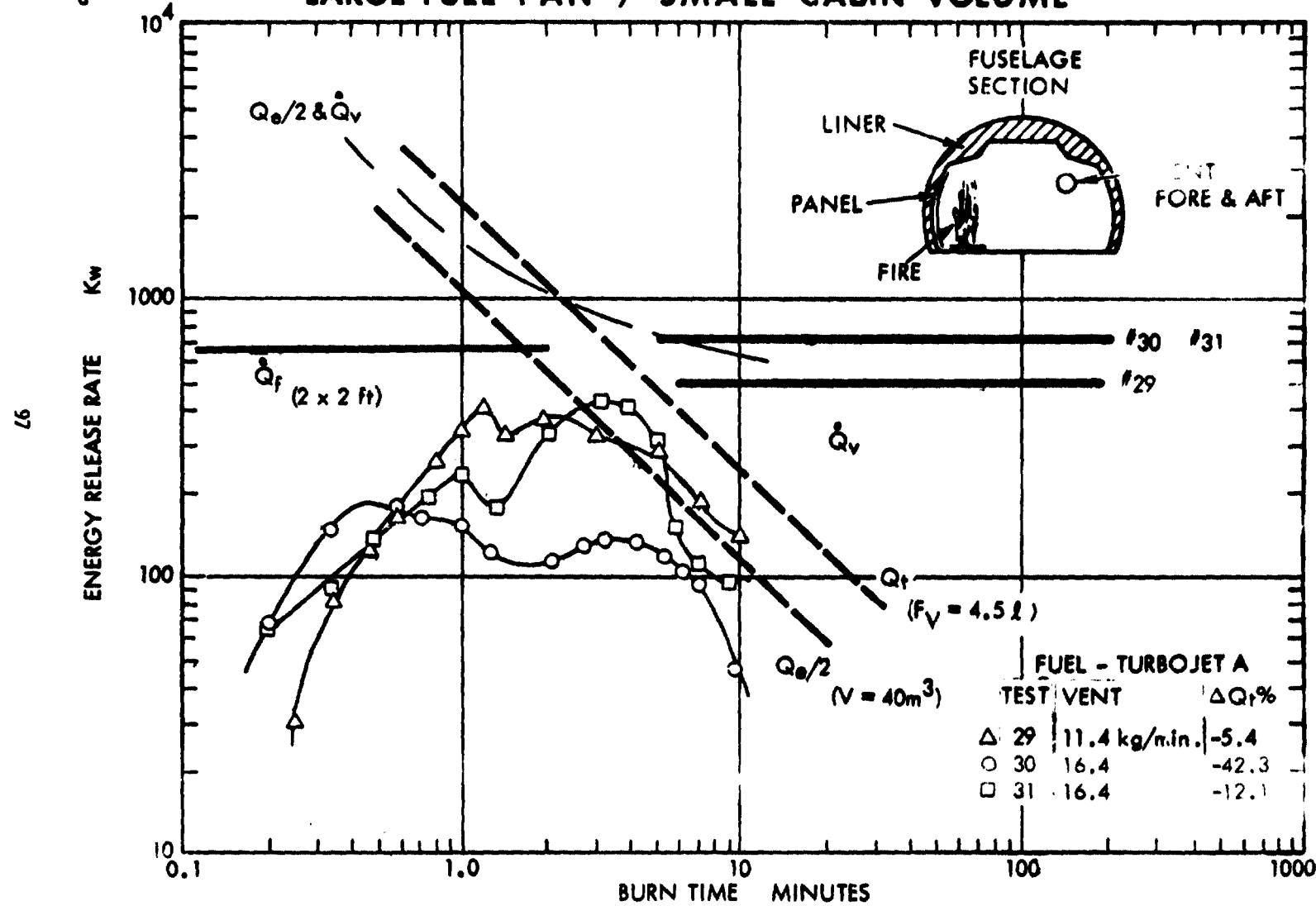
## DATA VARIABILITY

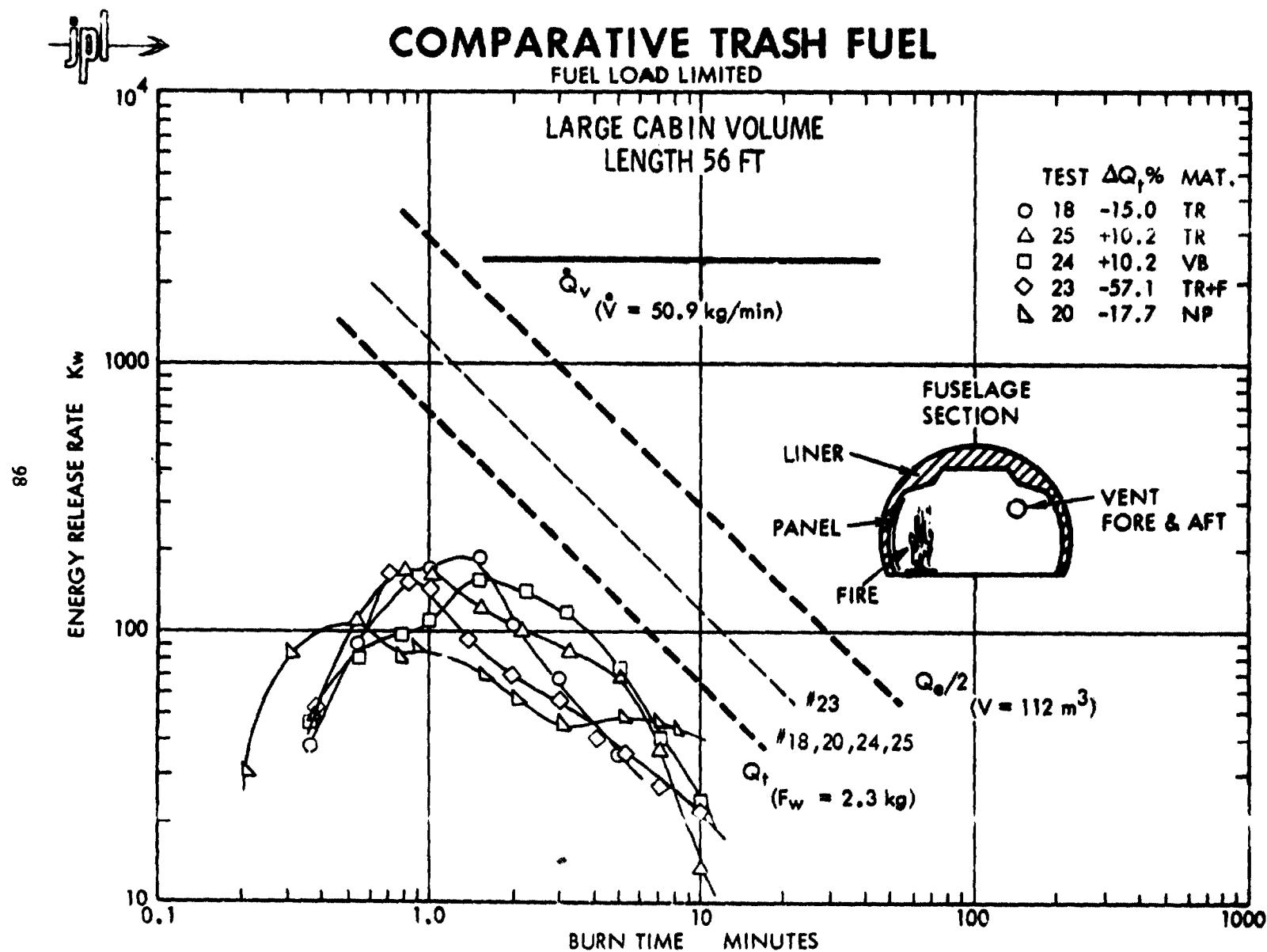
### LARGE FUEL PAN / LARGE CABIN VOLUME

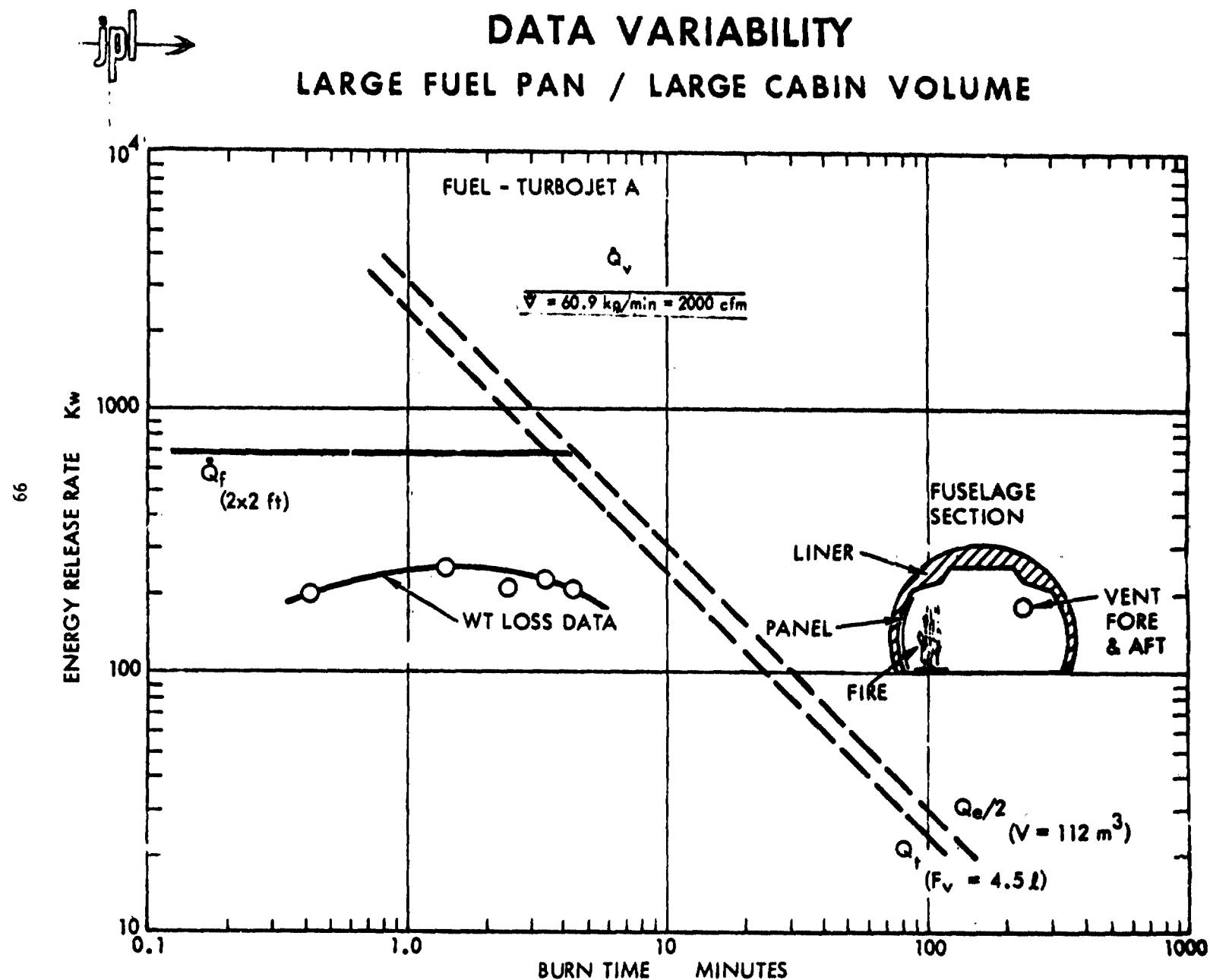


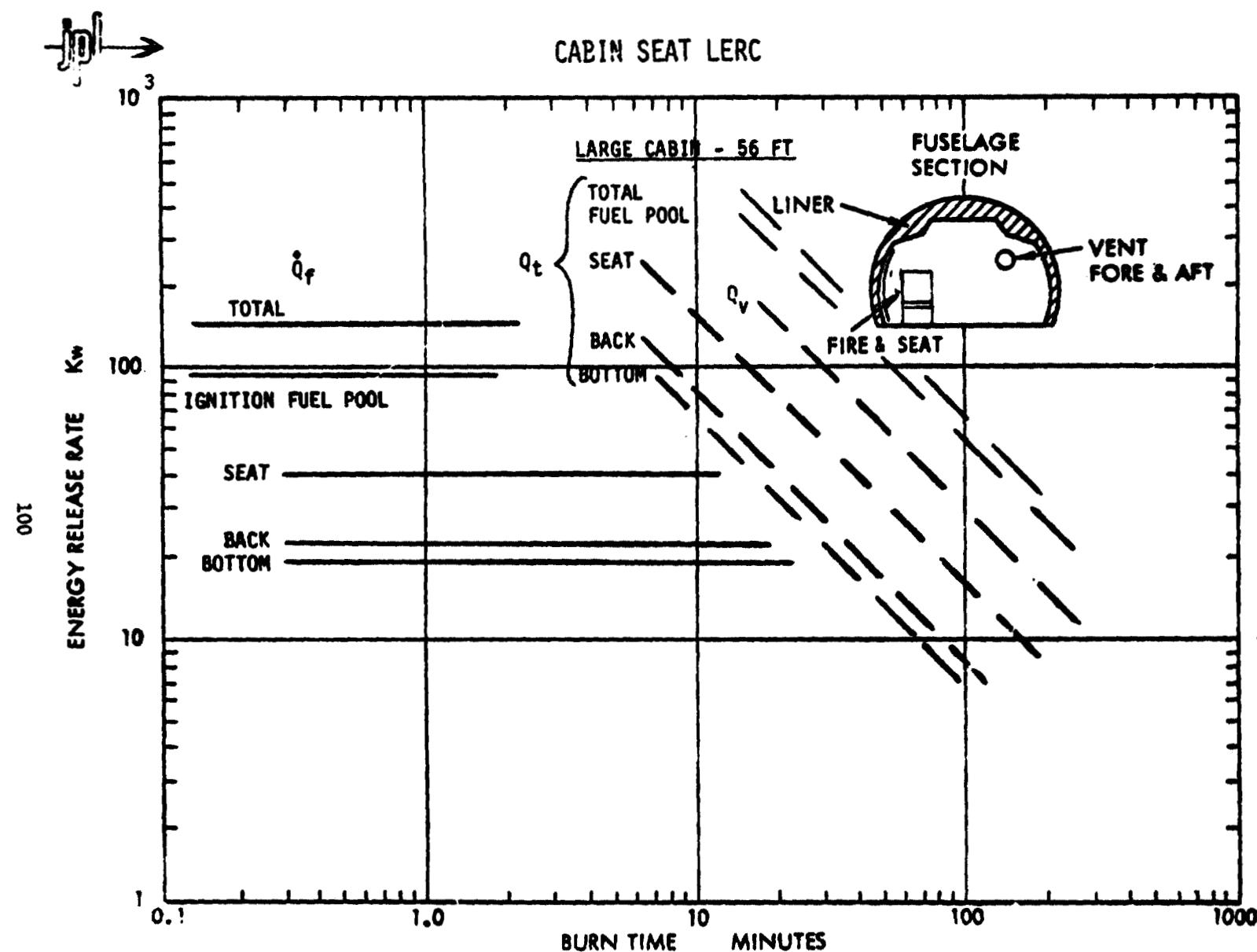


## DATA VARIABILITY AND COMPARISON LARGE FUEL PAN / SMALL CABIN VOLUME











## CONCLUSIONS

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- A COMPLETE LERC APPLICATION TO THE JSC/BOEING TESTS VERIFIES THE FUEL LOAD CRITERION AS THE CONSISTENT LIMITING CONSTRAINT
- THE VARIABILITY OF MAGNITUDE AND FORM OF THE RESULTS OF REPEATED TESTS WITH AND WITHOUT SMALL VARIATIONS IN PARAMETERS EMPHASIZES THE SIGNIFICANCE OF THE LOCAL FLOW, SPECIES-CONCENTRATION, AND HEAT-TRANSFER DISTRIBUTIONS
- WEIGHT-LOSS MEASUREMENTS OF RECENT JSC TESTS SHOW CONSISTENT RESULTS WITH PRIOR METHODS; FUEL LOAD CONSTRAINED